

Physical Chemistry Laboratory I, CHEM 1430

Fall 2025

Chevron Science Center 314

Course Instructors:

Lab Director: Dr. Kimberly Carter-Fenk (she/her)

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Lab Instructor: Dr. Nathan Tolman (he/him)

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Course Learning Objectives

Through active engagement and completion of lab activities, you will be able to:

- Operate specialized scientific instrumentation for measurement of physical properties and chemical change and troubleshoot issues with the measurements
- Analyze thermodynamic and spectroscopic data in Excel and interpret the data using theory and quantitative models
- Propagate experimental measurement uncertainties and perform error analyses
- Perform quantum chemistry calculations with careful thought towards the selection of the method and basis set.
- Write abstracts, results, and discussion sections following American Chemical Society (ACS) publication formatting

Course Websites:

Course materials such as the syllabus, course schedule, lab manuals, pre-lab assignments, lab report rubrics, and other helpful information will be found on [Canvas](#). Please regularly check the Canvas page for announcements! All assignments will be submitted on Canvas.

Required Support Materials:

- Safety glasses, splash-proof safety goggles, and flame-resistant lab coats will be provided in lab; feel free to bring your own if you do not want to use the shared laboratory PPE.
- Laboratory computers are available for use and are connected to the internet. If you wish to prepare lab assignments on your personal computer, you will need to download and install Microsoft Office, which is available for free through the Pitt Software Download Service: <https://my.pitt.edu/task/all/software-download>.

Lab Assignments and Deadlines

Pre-Lab Assignments:

- Pre-lab assignments are **due no later than 24 hours before the start of your lab period**; pre-lab assignments can be submitted 0-23:59 hours before lab in exchange for one token (see “Token System” section below for further details).
- Pre-lab questions are to be completed and submitted **individually**.
- You are not allowed to start your lab experiment until your pre-lab assignment is complete. All pre-lab assignments are submitted on Canvas.

- Pre-lab assignments will be evaluated based on completion and effort. Answers will not be graded for accuracy, but rather for genuine effort.

Lab Notebooks and Lab Performance:

- Each group will be given a lab notebook to record any chemicals/masses/volumes used in the experiment, your notes on the procedure/any alterations to the given procedure, instrument parameters, data file names, and data file locations.
- All **notebook pages should be signed by the instructor before leaving lab**, and you are encouraged to store your notebook in the lab.
- Lab notebooks will be evaluated for completeness in record-keeping.
- Lab performance is awarded based on preparation, good lab technique, safe laboratory practices, and cleaning up at the end of the experiment.

Lab Manual and Post-Lab Questions:

- Each group will submit their typewritten responses to the analysis questions (“Thinking About the Data”) and post-lab questions contained in the lab manual to Canvas before the start of the following lab. Hence, **each group has one week to complete their analysis**.
- All lab manual and post-lab typewritten responses are submitted on Canvas.
- The lab manual and post-lab exercises are evaluated for accuracy and completion.
- Your group’s lab manual and post-lab questions can be submitted up to 48 hours late in exchange for 2 tokens per group member (1 token/24 hours).
- Each group can submit **one revision per lab** for an improved score. Any changes to the original submission should be **highlighted** before uploading to Canvas. **Revisions are due two weeks following receipt of your graded assignment**.

Lab Reports and Peer Review

- In CHEM 1430, a complete lab report comprises an abstract, results section, and discussion section. You will write an abstract for your Electronic Structure Theory labs, an abstract and results section for the Rovibrational Spectroscopy lab, and two complete reports for two additional labs.
- All writing will be conducted **individually**, and all drafts will be submitted on Canvas.
- Some lab time will be dedicated towards peer review of lab report drafts. Peer review will be conducted on Canvas, and all **peer review must be completed within 48 hours** of the lab start time corresponding to the draft due date. Peer review will be evaluated for the effort in providing respectful, constructive feedback.
- To facilitate meaningful peer review, all **drafts must be turned in on time**. Failure to submit a draft or peer evaluation on time will result in a zero for that assignment.
- While drafts have strict deadlines, the final report submitted for a grade can be turned in up to 72 hours late in exchange for 3 tokens (1 token/24 hours).
- **One revision per report** can be submitted for an improved score in exchange for two tokens. All revisions must be turned in by **Friday, December 5th at 5 pm**. Please **highlight** any changes to the original submission before uploading your revised report to Canvas.

Final Presentations

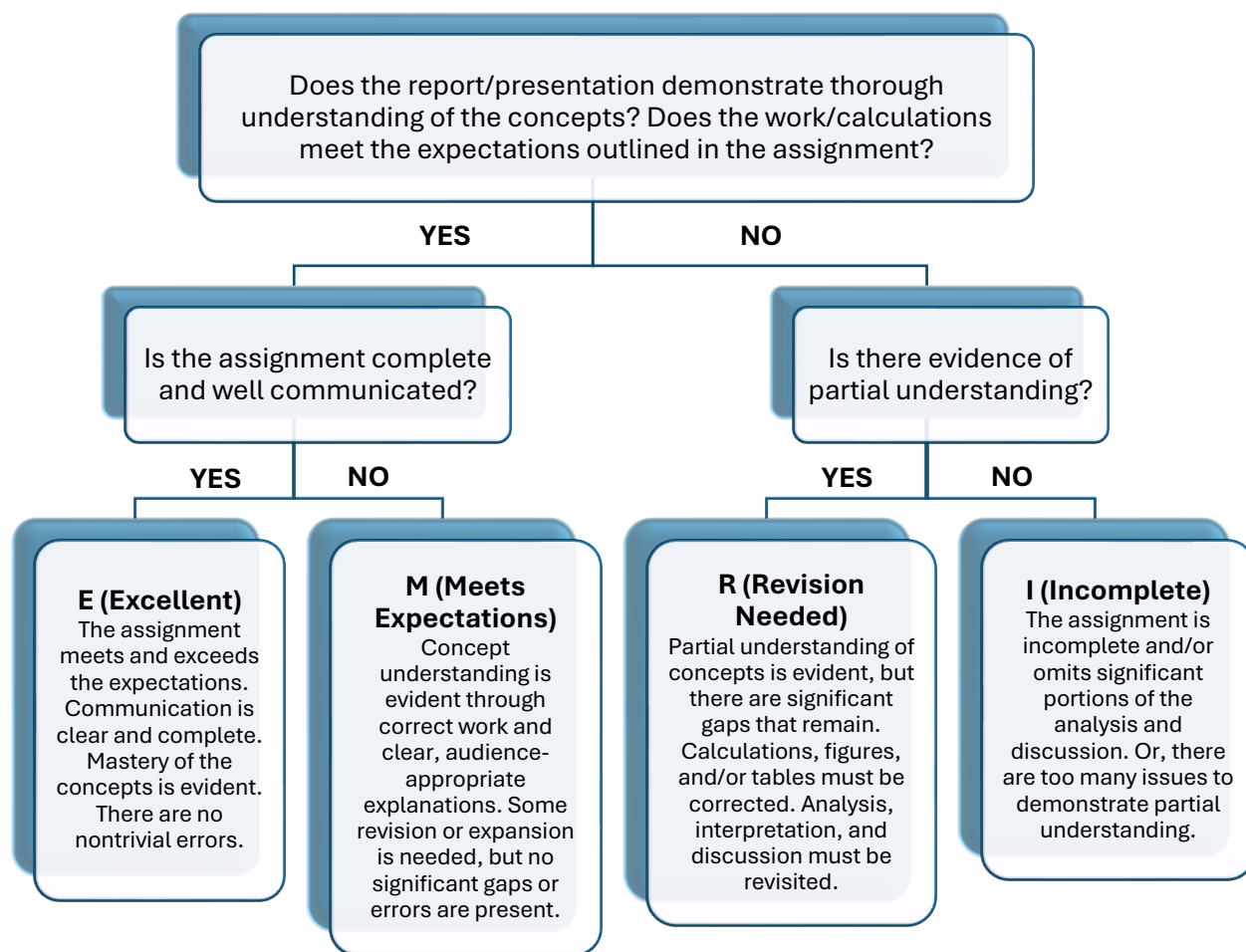
- During the last week of classes, you will give a 10-minute PowerPoint presentation on a scientific article in a physical chemistry journal, an emerging area of physical chemistry, or

an application of physical chemistry. You are free to select the topic of your presentation in consultation with your instructor.

- You will provide a peer evaluation of two presentations using a predefined rubric found on Canvas. All peer reviews will be submitted on Canvas.

Grading System

Each assignment will have a specific rubric that outlines criteria for successful completion and demonstration of understanding. All rubric items for lab manual questions and lab reports will be graded on a three-point scale in which “Excellent” work corresponds to three points, work that “Meets Expectations” corresponds to two points, and work that requires “Revisions” corresponds to one point. “Incomplete” rubric items will receive zero points.



Modified EMRI rubric based on the EMRN rubric by Robert Talbert licensed under [CC-BY-SA-4.0](https://creativecommons.org/licenses/by-sa/4.0/) and the original EMRF rubric by Rodney Stutzman and Kimberly Race (<https://eric.ed.gov/?id=EJ717675>).

The final course grade will be assigned based on the minimum requirements listed in the table below. Lab support assignments comprise pre-labs, lab notebooks, lab performance, report drafts, and

peer reviews. These assignments will be awarded an M (“Meets Expectations”) or an I (“Incomplete”); the minimum number of Ms required to earn a desired grade is based on the 30 total lab support assignments throughout the semester (10 pre-labs, 11 lab notebooks/lab performance scores, 5 peer reviews, and 4 report drafts). For example, to earn a B in the course, you must earn at least an 83% on the lab manual/post-lab questions, lab reports, and the final presentation; additionally, you must satisfactorily complete 26 out of 30 lab support assignments.

Grade	Lab Manual & Post-Lab Questions	Lab Reports & Writing	Final Presentation	Lab Support Assignments
A+	≥95%	≥93%	≥93%	30 Ms
A	≥92%	≥91%	≥91%	29 Ms
A-	≥90%	≥89%	≥89%	28 Ms
B+	≥87%	≥86%	≥86%	27 Ms
B	≥83%	≥83%	≥83%	26 Ms
B-	≥80%	≥80%	≥80%	26 Ms
C+	≥77%	≥76%	≥76%	25 Ms
C	≥73%	≥73%	≥73%	25 Ms
C-	≥70%	≥70%	≥70%	24 Ms
D+	≥67%	≥66%	≥66%	23 Ms
D	≥63%	≥63%	≥63%	22 Ms
D-	≥60%	≥60%	≥60%	21 Ms

Token System

Throughout the semester, students will have the opportunity to earn tokens that can be used to submit late work without penalty. The following table lists the quantities of tokens that can be earned and the token “costs” for all flexibility opportunities:

	Tokens Earned	Token Cost
Late arrival by >10 minutes		1
Staying the full 3 hours and 50 minutes of lab time	1	
Submitting the Pre-Lab 0-23:59 hours before lab		1
Late submission of lab manual/post-lab questions (up to 48 hours past the deadline)		1 token/24 hrs. (Max. 2 tokens)
Late submission of lab report (up to 72 hours past the deadline)		1 token/24 hrs. (Max. 3 tokens)
Revise and resubmit lab report		2
Submit 2 questions for guest speaker before lab	1	
Attend office hours (max. earned 1x per week)	1	

All students who complete the Academic Integrity badge will receive two tokens. Hence, students will have the opportunity to earn a maximum of 33 tokens throughout the semester: 14 tokens for full lab attendance, 14 tokens for office hours attendance, 3 tokens for guest speaker question submission, and 2 tokens for completion of the Academic Integrity badge.

To apply a flexibility policy in exchange for tokens, you must fill out the “Token Exchange Form” using the following link: <https://forms.office.com/r/7i0hawAQFN>. To receive an extension, the form must

be filled out by the assignment deadline. Failure to submit an assignment on time without filling out and submitting the Token Exchange Form will result in an Incomplete (I) score. A late arrival of greater than 10 minutes without applying any tokens will result in an Incomplete (I) score for lab performance; the Token Exchange form for a late arrival must be submitted before the end of lab.

Eye Protection Policy

Anyone in the physical chemistry laboratory is required by the University and Department of Chemistry to always wear approved safety eyewear. There are no exceptions. Splash proof safety goggles are mandatory for the wet lab area. In addition, a face shield must be used when dispensing liquid nitrogen. Any student not in compliance with either rule will first receive a verbal warning from the laboratory instructor. After a second offense of the same rule, the lab instructor will assign an I to the lab performance score. Gross negligence for safe and professional lab work will result in additional penalties, beyond that outlined above. Any student dismissed from two lab periods during the semester for violation of the eye safety policy will meet with Dr. Carter-Fenk to determine if additional action, such as dismissal from the course or a grade of F for the course, is appropriate.

Group Work Policies

Science is highly collaborative, and working effectively with others is a highly desired skill in the professional world! This lab is an opportunity to practice your teamwork and interpersonal communication skills. We encourage you to work through any disagreements using effective conflict management strategies, which are detailed in the following link: <https://www.northcentralcollege.edu/news/2022/09/13/why-conflict-resolution-important>.

This lab highly values teamwork, and part of your lab performance score will be based on your effectiveness working with your group members. Because you will plan your experiments and analyze your data in groups, the success of your group will be bolstered by the contributions of all members! It is important that groups consistently communicate and work together, consider the contributions of all members, move forward towards a common goal, and act as a cohesive unit that supports and includes all team members.

Additional Course Policies

Lab absences and assignment extensions can be offered without tokens for reasons related to illness, injury, bereavement, family emergencies, religious observances, etc. As much as possible, please communicate with Dr. Carter-Fenk in advance to arrange for extended deadlines and/or accommodations.

The observance of religious holidays (activities observed by a religious group of which a student is a member) and cultural practices are an important reflection of diversity. As your instructor, I am committed to providing equivalent educational opportunities to students of all belief systems. At the beginning of the semester, you should review the course requirements to identify foreseeable conflicts with assignments, exams, or other required attendance. If at all possible, please contact Dr. Carter-Fenk within the first two weeks of the first lab to allow time for us to discuss and make fair and reasonable adjustments to the schedule and/or assignments.

Disability Services

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and [Disability Resources and Services \(DRS\)](#), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Academic Integrity

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

The University Library System has developed four modules on plagiarism, honesty, ownership of intellectual property, and scholastically appropriate behavior established by the academic community and the University of Pittsburgh. To enroll and complete these modules, visit the link below. After you have reviewed the modules, you will take a quiz on all aspects that you learned. When you complete the quiz with a score of $\geq 80\%$, you will receive a completion badge. Email that badge to your instructor. None of your lab assignments will be considered "submitted" until your badge is received. Complete the four modules and summary quiz found at [Understanding and Avoiding Plagiarism tutorial](#).

AI is becoming an ever-increasing presence in our society. For this course, direct cut and paste of information and prose generated by AI systems is strictly prohibited. If you choose to use AI to help edit your writing, you must reference which AI system you used (including a version of the software) and the date that you accessed it.

Course Expectations

All people have the right to be addressed and referred to in accordance with their personal identity. In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed. We will all do our best to address and refer to students accordingly and support one another in doing so as well.

What you can expect from us (Dr. Carter-Fenk and Dr. Tolman)

We are here to guide your learning and will challenge you to actively engage in the learning process through lab activities, assignments, and more. We will strive for an inclusive and collaborative classroom – one that is respectful of gender, disability, age, race, and all other dimensions of diversity and identity, as well as each student's unique circumstances at this time. We will do our best to give you the tools, feedback, and support to succeed, and will always welcome suggestions for improvement. Learning is a never-ending process, so we hope to motivate students to seek out more information on topics explored in lab. We highly encourage everyone to visit us in office hours or to set up a meeting, even if you don't feel that you have questions. We want to get to know you and support you in this learning experience! The best way to reach us is by email (see contact information), and you can expect us to respond within 24 hours.

What we expect from you

We expect you to take an active role in your learning by coming to lab prepared and ready to collaborate with your lab partner(s). Keep in mind that each member of this class has different ideas and perspectives that will enrich the experience for us all. We expect everyone to speak and listen with compassion and to enter every conversation with the acknowledgement of your shared goal – to do well in this course! Never hesitate to email your lab instructors, join our office hours, or set up a meeting. This lab course should challenge you, and we believe that everyone can succeed with effort and dedication!

Your Well-Being Matters

College can be an exciting and challenging time for students. Taking time to maintain your well-being and to seek appropriate support can help you achieve your goals and lead a fulfilling life. It can be helpful to remember that we all benefit from assistance and guidance at times, and there are many resources available to support your well-being while you are at Pitt. You are encouraged to visit [Thrive@Pitt](#) to learn more about well-being and the many campus resources available to help you thrive.

If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources. Dr. Carter-Fenk and Dr. Tolman care about you and want to support you as best we can.

The [University Counseling Center](#) is also here for you. You can call 412-648-7930 at any time to connect with a clinician. If you or someone you know is feeling suicidal, please call the University Counseling Center at any time at 412-648-7930. You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.